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Volkswagen Industrial Cloud

digifab - Ostfalia

2021-02-18 / Dr. Roy Sauer

Classification: PUBLIC

Volkswagen Group Overview – Largest carmaker in the world

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12 brands

Passenger vehicles

Luxury and sports vehicles

Commercial/heavy vehicles

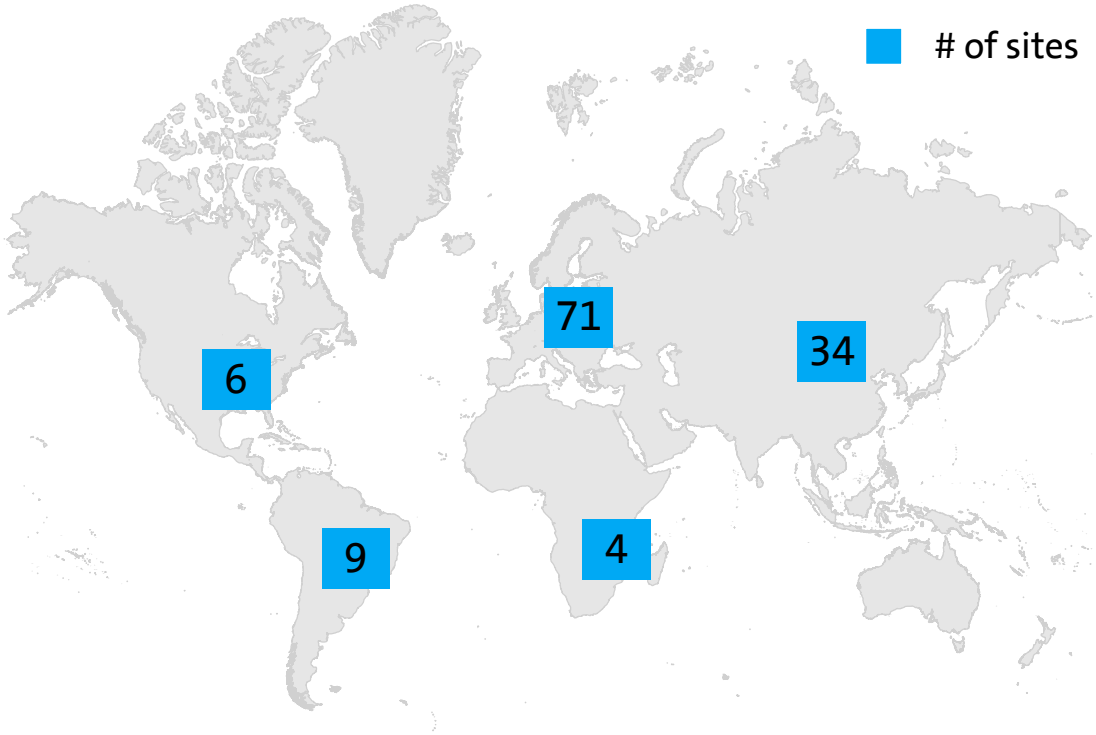
~670k
employees

~124
Production sites globally

€252.6 bn
revenue

~11 mn
Deliveries worldwide

€17 bn
operating result



Source: volkswagenag.com; annual report 2019

As the industry changes, Volkswagen will transform its production and supply chain by using advanced industrial IoT

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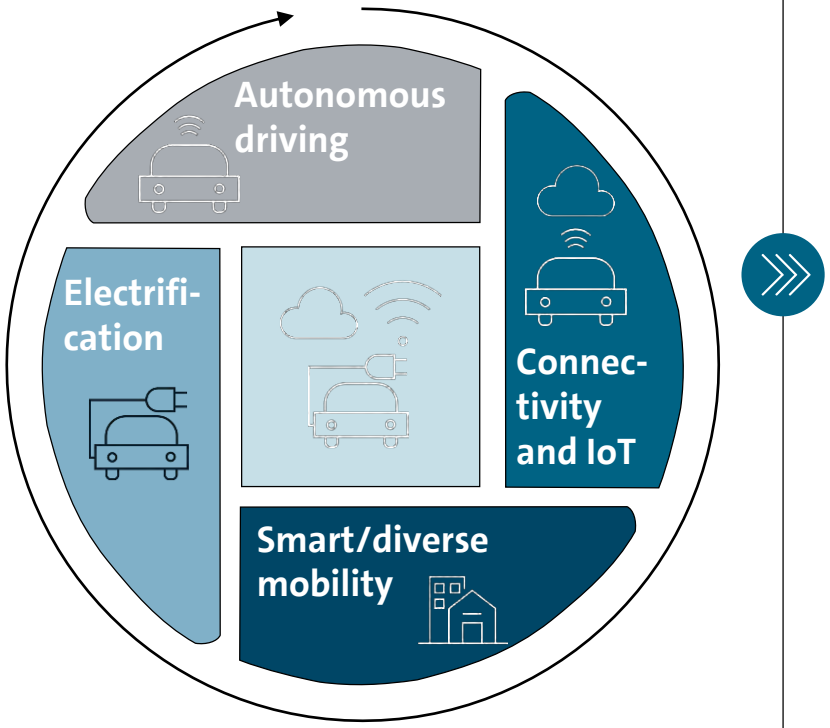
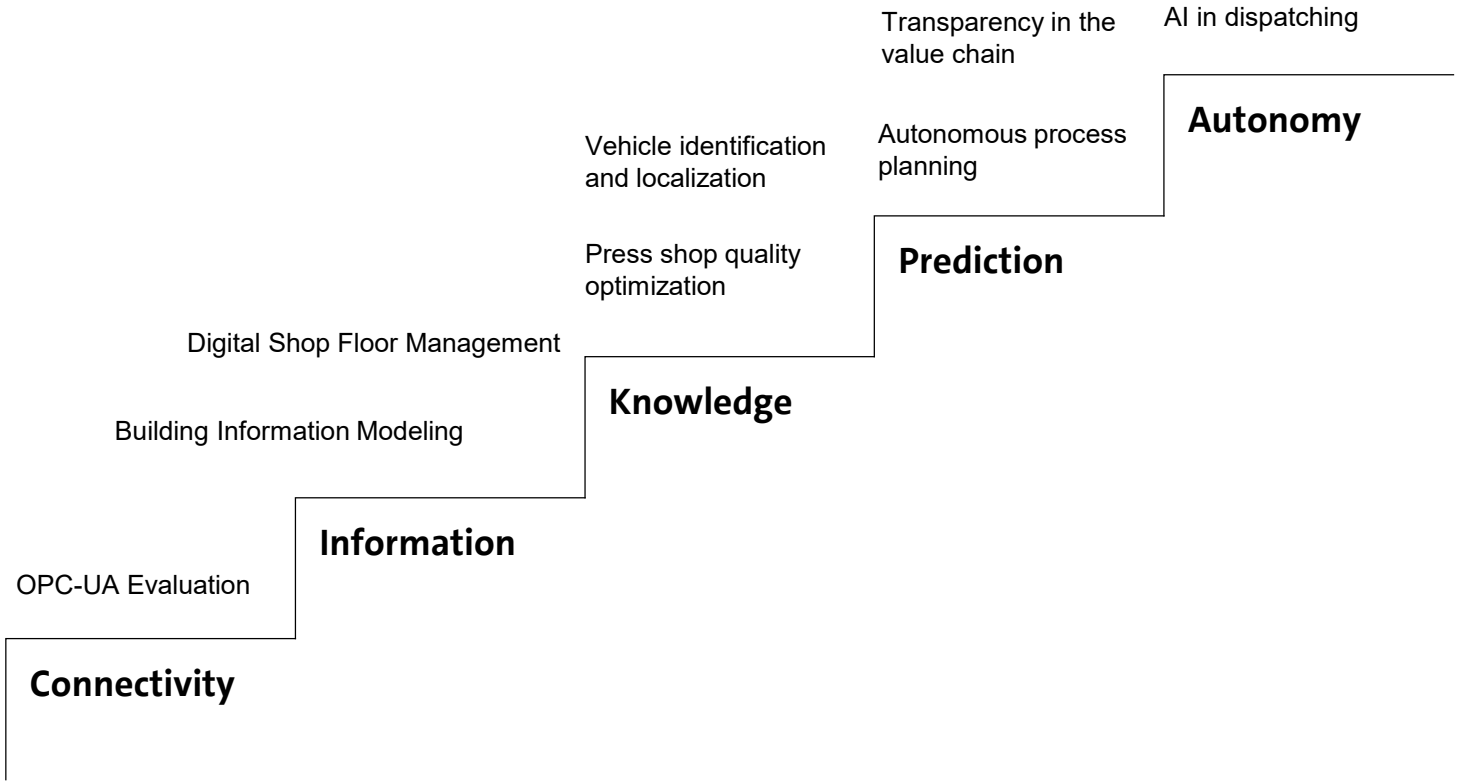
4 disruptive technology-driven trends are radically changing the mobility industry



Step by step, we want to increase productivity in production by 30% until 2025 compared to 2016 by using industrial IoT



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Volkswagen, together with leading industrial partners, AWS & Siemens, want to create an open community for the automotive industry and manufacturing industries beyond, to enable the future of digital production and logistics.

We are already cooperating with strong partners and started building the Industrial Cloud – Amazon Web Services (AWS) and Siemens each contribute key expertise and resources in a long-term partnership

Strategic technology partner

- Provides **cloud infrastructure** as **scalable backbone** of Digital Production Platform
- Provides existing **IoT platform** product as **starting ground** for **development**
- Injects **state-of-the-art technology and innovations**

Volkswagen

- Provides **process and industry domain know-how**
- Develops specific **use cases** for Volkswagen **production network** and drives implementation

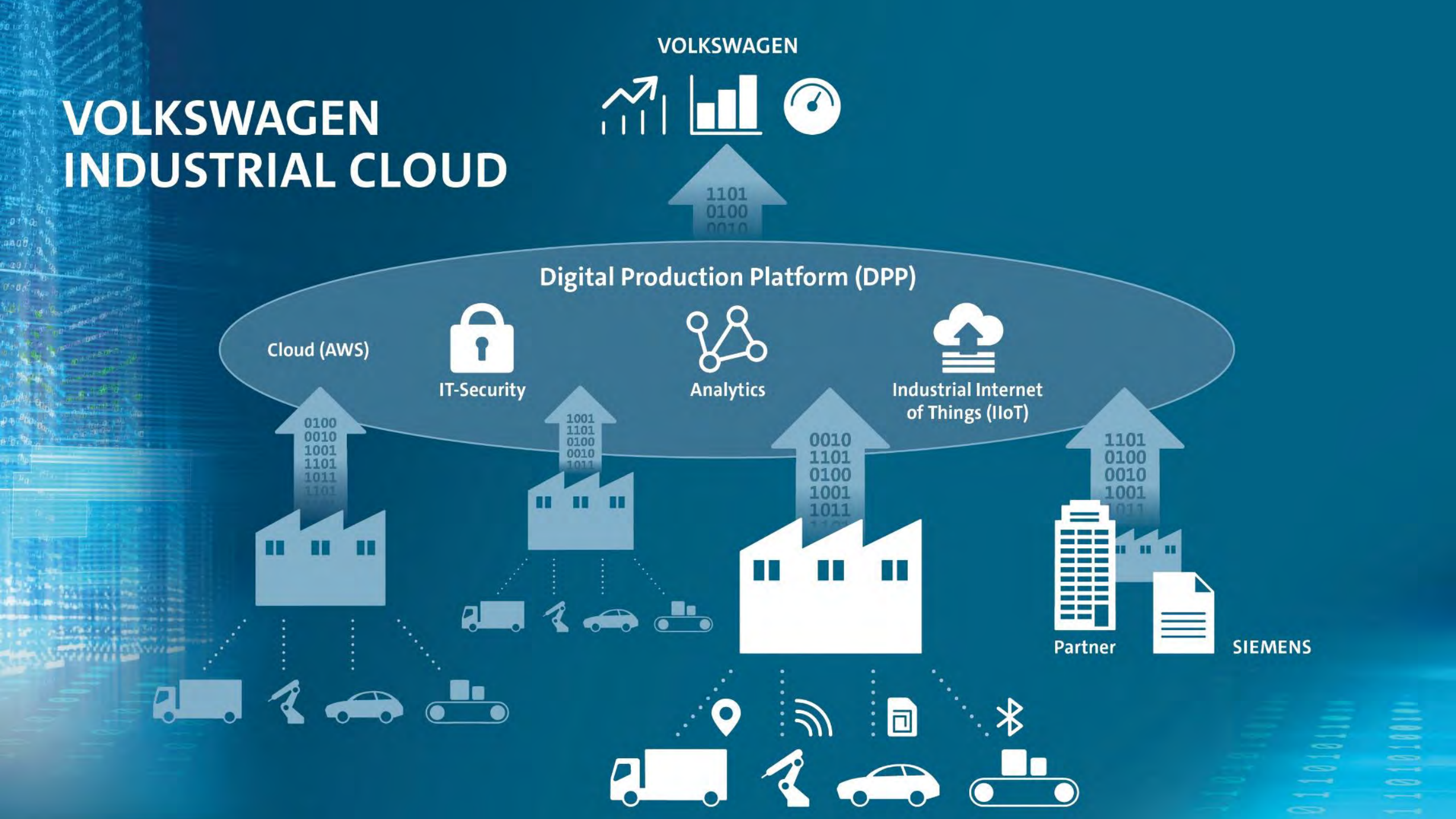
Integration partner

- Contributes expertise in terms of **connectivity of shop floor machines and equipment (IT/OT integration)**
- Uses existing microservices to provide **digital solutions and applications** (service layer)
- **Pilots** new **platform services** to support **time-to-market** for new **solution applications**

Strategic technology partnership

Integration partner as part of partner network

VOLKSWAGEN INDUSTRIAL CLOUD



The Industrial Cloud and the Digital Production Platform

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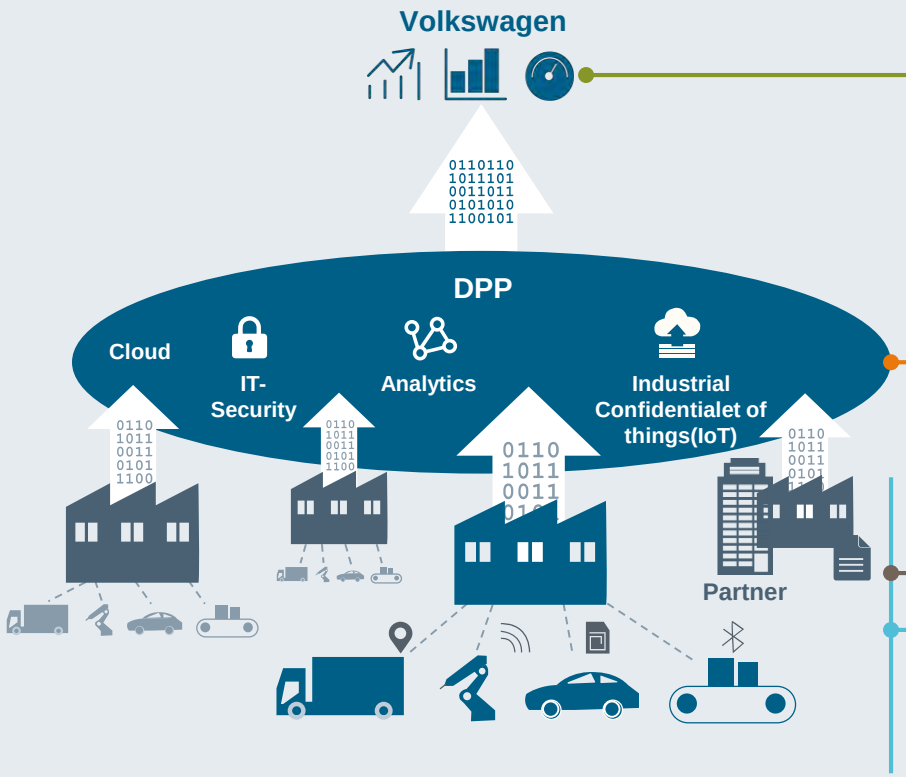
Illustration of VW DPP & Industrial Cloud



Strategic levers

Speed (DPP)

- Deploy use cases and technologies **fast** to **improve productivity**

Costs (DPP)

- Manage VW DPP platform **efficiently** and **effectively**
- **Reduce** production **costs**
- **increase** productivity and equipment availability

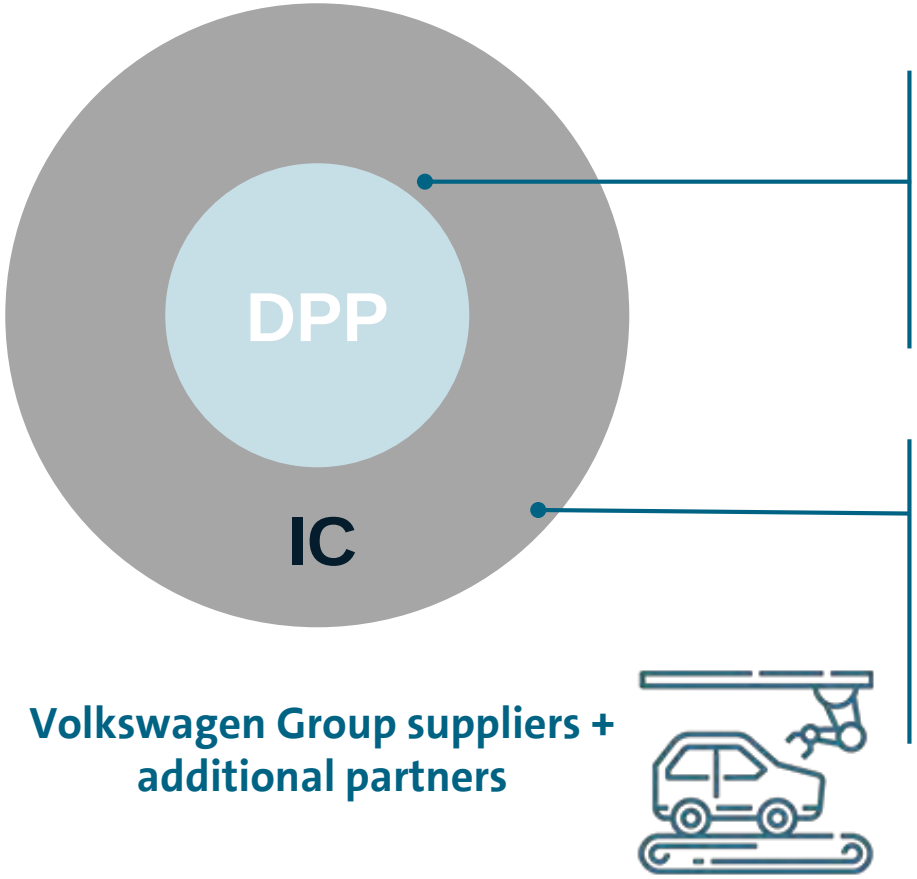
Business Models (IC)

- Drive a joint **Go-to-market** strategy
- **Benefit** from bringing partners to the Industrial Cloud
- Strategic investment results into **sustainable ROI**

Open Platform (IC)

- Build the **leading IIoT platform** for the **automotive industry**
- Establish **open** and an **integrated platform architecture**

A flexible, comprehensive digital platform reduces information disparity and democratizes innovation



We need a powerful industrial IoT platform to kick start innovation in manufacturing and production

Digital Production Platform (DPP)

- Combines data of all machines, plants and systems
- Cloud-based platform essential to scale up new applications rapidly across the world

Industrial Cloud (IC)

- Based on the DPP, the Industrial Cloud will be an open industry platform
- Global supply chain with numerous suppliers and partner companies to be integrated

We needed to transform from a fragmented IT landscape to an integrated platform architecture

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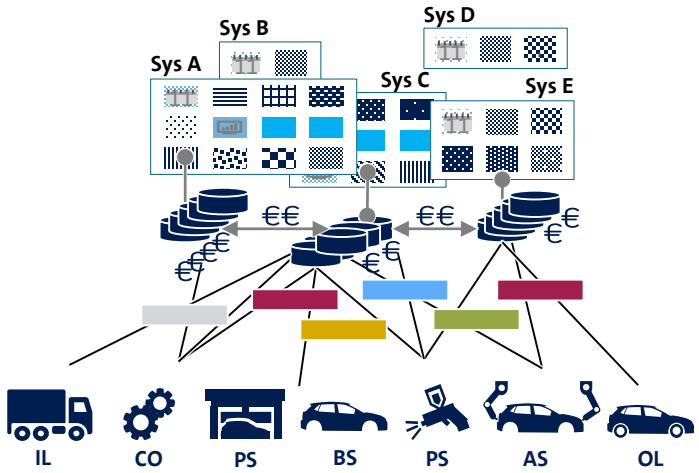
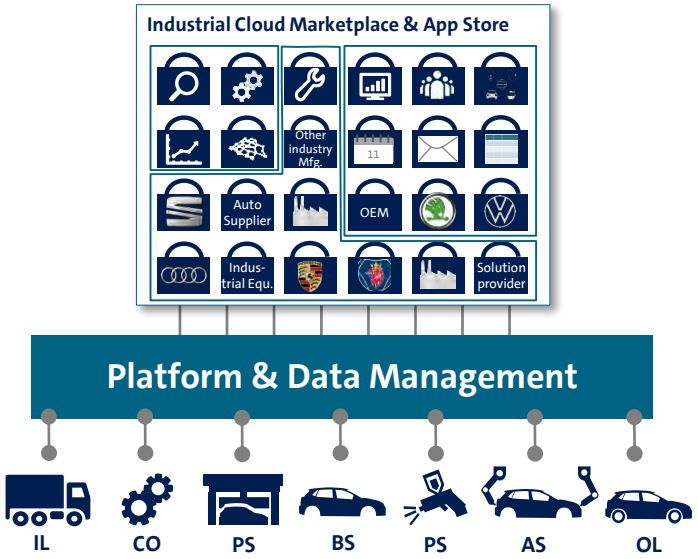
Fragmented IT/OT Landscape



Complexity ↑	Development Expenses ↑	Operational Costs ↑
Consolidation ↓	System Flexibility ↓	Production Stability ↓

Integrated Platform Architecture



Complexity ↓	Development Expenses ↓	Operational Cost ↓
Consolidation ↑	System Flexibility ↑	Production Stability ↑

IL: Inbound Logistics **CO**: Components **PS**: Press Shop **BS**: Body Shop **PS**: Paint Shop **AS**: Assembly **OL**: Outbound Logistics

Volkswagen Industrial Cloud in numbers
Status 2020

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3
Plants already connected in 2019

16
Further plants connected in 2020

124
Plants to be connected globally overall

21
Initial applications/use cases available to all plants as core standard

220
Experts working on the project and to be further expanded

30
Percent productivity improvements expected in production

>200 mn EUR
Run rate savings in 2025 with 15 existing applications

Several bn EUR
Savings at full roll-out across all plants and with all use cases

Source: https://www.volkswagen-newsroom.com/en/press-releases/volkswagen-steps-up-development-of-industrial-cloud-5996

We work backwards together with AWS

AWS Mechanism

DIGITAL
PRODUCTION
PLATFORM

aws | VOLKSWAGEN GROUP

Press release

SEATTLE & WOLFSBURG, GERMANY--(BUSINESS WIRE)--Sept. 30, 2019--Today, Amazon Web Services, Inc. (AWS), an Amazon.com company (NASDAQ: AMZN), and the Volkswagen Group (VW Group) announced the availability of the Digital Production Platform (DPP).

The DPP provides foundational platform services, spanning the public cloud to the edge, that integrate and process data from machines and production systems on the shop-floor in a federated data layer and provides a set of standardized interfaces for software applications.

Volkswagen – AWS Collaboration

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DPP Executive Committee

aws | VOLKSWAGEN AKTIENGESELLSCHAFT

Cloud Business Office (CBO)

AWS DPP Manager — aws | VOLKSWAGEN AKTIENGESELLSCHAFT — VW DPP Managers

Partner Reps

Brand Reps

Senior Platform Team

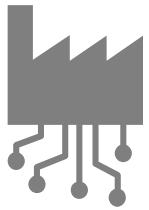
DPP Software Development Manager

DPP Technical Product Manager

DPP Technical Product Manager

Principal Engineer

Principal Scientist

Pizza team	Pizza team	Pizza team	Pizza team	Pizza team	...
					...

Roles in agile pizza teams

- ✓ Product Owner
- ✓ Software Dev. Manager
- ✓ Development engineers
- ✓ Subject matter experts
- ✓ ....

Use cases are based on DPP platform services to achieve interoperability across plants and quick value capture

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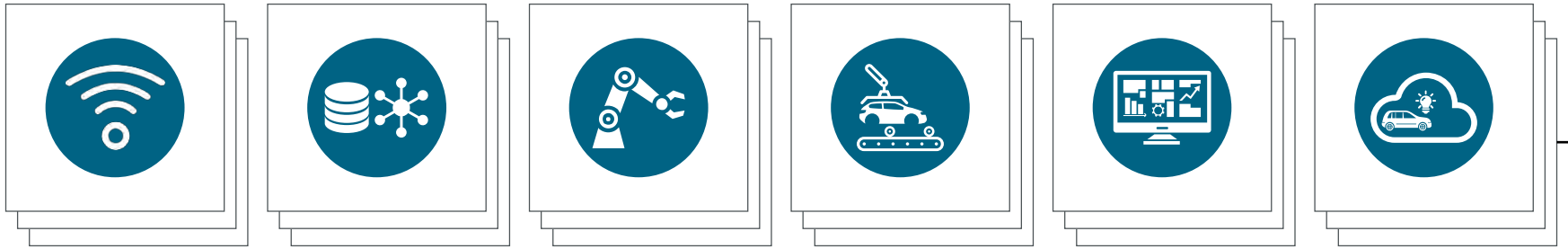
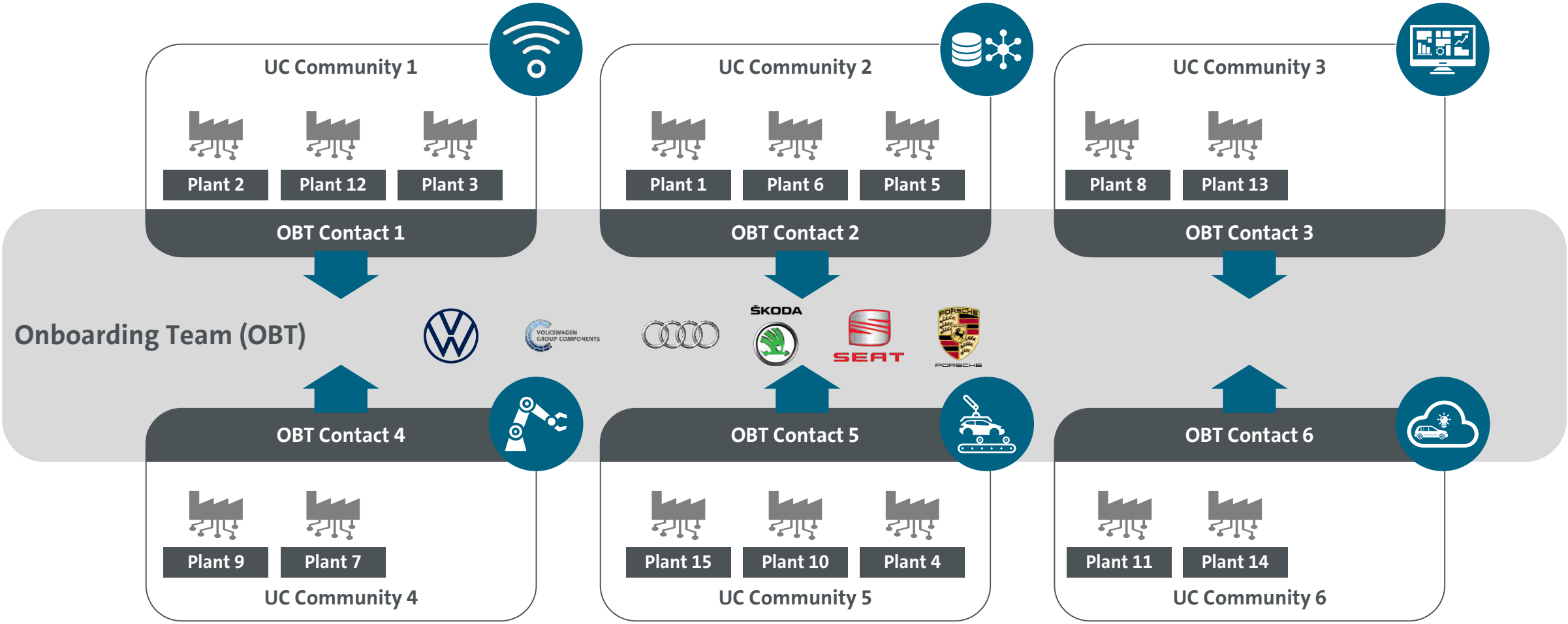
Use cases



The platform backlog is driven by demand from use case teams

Communities driven by plants and coordinated by the joint onboarding team are developing use cases and ensure scalability



Teams across the whole Group have already created scalable Use Cases

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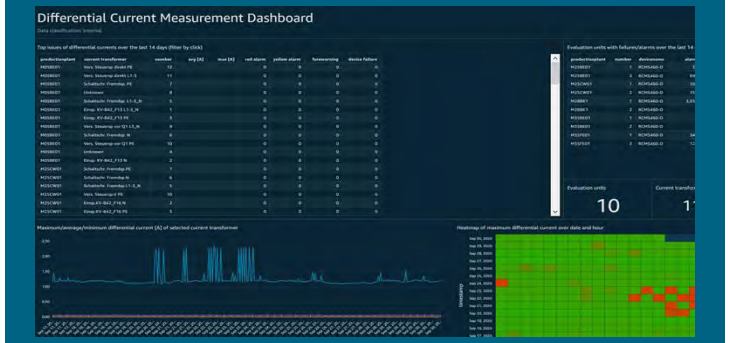
Intelligent Sign Inspection (ICV)

Porsche uses computer vision to automate the quality control of certification signs and labels, leading to faster production times and quality

Differential current dashboard



Volkswagen uses real time machine energy data to automate equipment safety checks and maintenance, leading to less production downtime

Bottleneck identification in body shop

Volkswagen Commercial Vehicles connects data from assembly lines to the cloud to identify bottlenecks in production

Use Case example: Porsche has created Intelligent Sign Inspection on DPP to reduce rework

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Industrial Computer Vision (ICV)

Guided documentation and quality inspection of prescribed signs using DPP components (based on AWS-Platform Services)

01 ICV Core

„The Core of Use Cases"

- Object **Inspection**
- Model **Library**

02 ICV Camera Service

„Camera Interface to ICV"

- Use of **Cameras**
- GDPR-consideration of **anonymization**

03 ICV Training Toolkit

„Self-Service Object inspection"

- Application-specific **Inspection**
- Intuitive **User Interface**

Porsche Assembly - ICV

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Series technical tact – inline label check

Stationary cameras enable automated label checks in assembly line

Inline rework area – manual label check

Mobile devices enable manual quality checks in inline rework areas

Offline rework and audit area – manual label check

Mobile devices enable manual quality checks in offline rework areas or audit areas

Main line
Pre-assembly

Key figures

2 plants

5 vehicle series

> 2000 label variants

Source: https://www.industrialcloudhub.com/en/Community/SuccessStories/Porsche_ICV.html

The Industrial Cloud Vision

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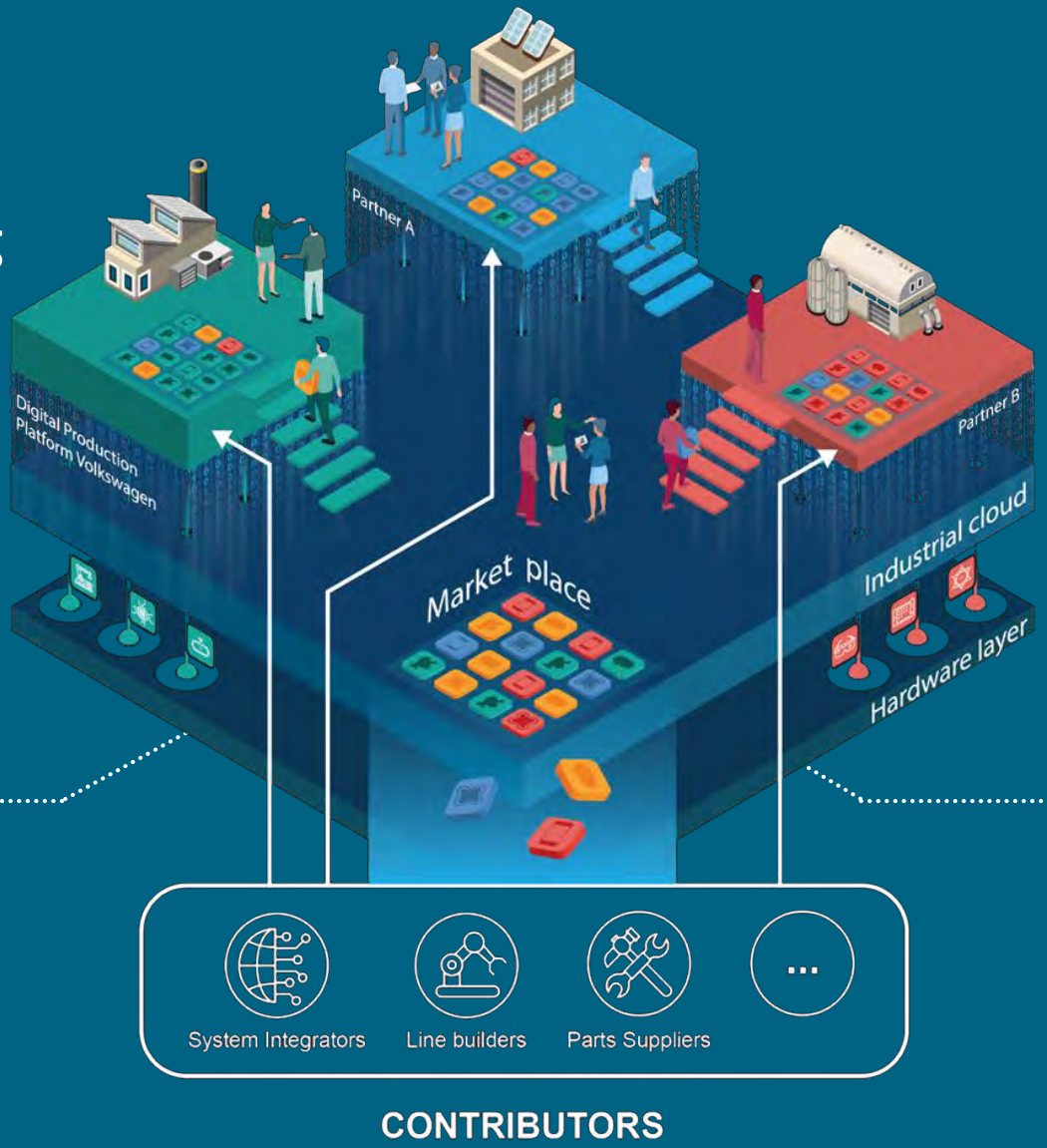
The **Industrial Cloud** will leverage the **potential of IoT solutions** to address the current challenges by **providing one open industry** platform for all partners to **collaborate on eye level**



Community

The IC is a large community of partners

However, partners can also create private communities in which they can decide which services and data to share with the broader community

Platform

- Fully integrated platform that provides technology from IT/OT layer to offering of apps and services
- Partners and third parties can be onboarded onto platform

Marketplace

- On the marketplace, data sets, apps and services will be shared between participants of the community
- The marketplace will bundle financial transaction and will function as central element for interactions between provider and consumer

The vision of an open and completely networked production across the entire value chain

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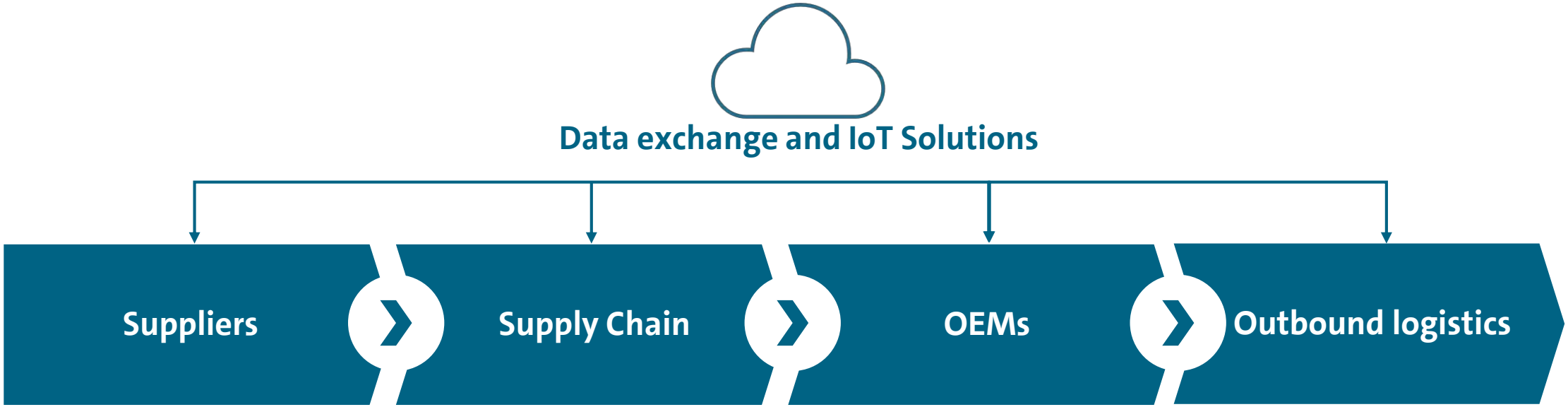

- **Supply chain integration** enables more **efficient collaboration** across the network
- Embedding **AI** in production and supply chain processes improves **quality** and **throughput**, leads to **shortened innovation cycles** which allows handling competing customer demands and tight development timelines
- Higher efficiencies in production processes lead to **shortened time to market** and thus create a **competitive advantage**
- **Process optimization and fast integration of new technologies** into the production environment and across the supply chain based **on open standards**

By the end of July 2020, the Industrial Cloud has welcomed 11 new members from three groups

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FOUNDING MEMBERS:

INDUSTRIAL CLOUD
aws | VOLKSWAGEN GROUP
SIEMENS

Industrial equipment providers

Potential users of the platform technology, can contribute use cases that work best with their equipment

ABB
DÜRR
GROB
WAGO

Industrial software providers

Capable of contributing solutions to marketplace and of supporting partners to realize own use case projects

ASCon Systems
The Digital Twin Company
celonis
NAVVIS
SYNAOS
teradata.

Global system integrators

Operational support for partners that want to use the platform as IoT platform in their plants

BearingPoint®
MHP
A PORSCHE COMPANY

Source: industrialcloudhub.com

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THANK YOU FOR YOUR ATTENTION.

DO YOU HAVE ANY QUESTIONS?